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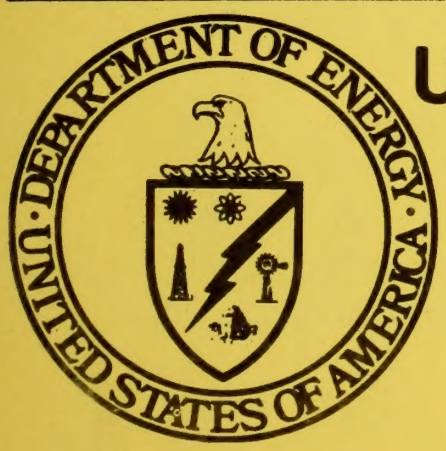
SOLAR/1012-79/05

Monthly Performance Report

J. D. EVANS

HOUSE A

MAY 1979



U.S. Department of Energy

National Solar Heating and Cooling Demonstration Program

National Solar Data Program

4296

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MONTHLY PERFORMANCE REPORT

J. D. EVANS, INC.
HOUSE A

MAY 1979

I. SYSTEM DESCRIPTION

J. D. Evans, Inc., House A is one of two instrumented single-family residences in Columbia, Maryland. The home has approximately 2250 square feet of conditioned space. Solar energy is used for space heating the home and preheating domestic hot water (DHW). The solar energy system has an array of flat-plate collectors with a gross area of 350 square feet. The array faces south at an angle of 45 degrees to the horizontal. Water is the transfer medium that delivers solar energy from the collector array to storage and to the space heating and hot water loads. Solar energy is stored in the basement in a 1000-gallon steel storage tank. Incoming city water is preheated in a liquid-to-liquid heat exchanger located in the storage tank and then flows into a conventional 40-gallon DHW tank. When solar energy is insufficient to satisfy the space heating load, a heat exchanger within a heat pump and an electrical heating element in the air-distribution duct provides auxiliary energy for space heating. Similarly, an electrical heating element in the DHW tank provides auxiliary energy for water heating. The system, shown schematically in Figure 1, has three modes of solar operation.

Mode 1 - Collector-to-Storage: This mode activates when the temperature difference between the storage tank and the collector outlet is higher than 15°F. Water circulates from the storage tank through the collector until a temperature difference of less than 5°F is reached.

Mode 2 - Storage-to-Space Heating: This mode activates when thermal energy for space heating is requested by the room thermostat. Solar-heated water from storage circulates through a liquid-to-air heat exchanger in the space heating air duct. If solar energy is insufficient to satisfy the space heating load, the heat pump and/or the auxiliary electrical heating element

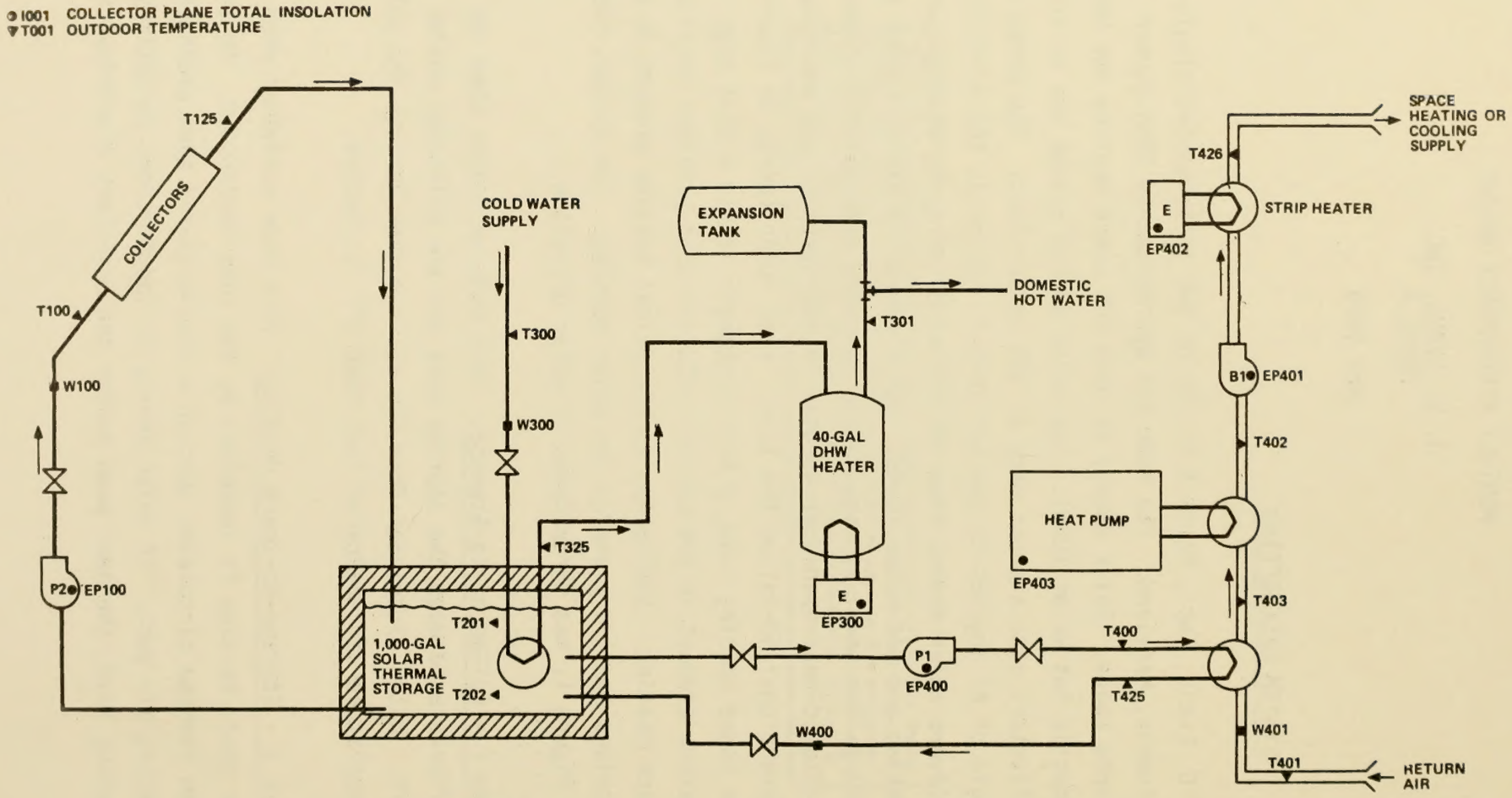

Figure 1. J. D. EVANS, INC., HOUSE A SOLAR ENERGY SYSTEM SCHEMATIC

will be activated. The electrical strip heater can also be manually operated without solar heating and heat pump operation.

Mode 3 - DHW Preheating: This mode is activated by drawing hot water from the system. Cold supply water is preheated in a liquid-to-liquid heat exchanger located in the solar energy storage tank before flowing to the DHW tank. If the required DHW tank temperature is not maintained by solar preheating, auxiliary energy is provided by the electrical heating element in the DHW tank.

II. PERFORMANCE EVALUATION

INTRODUCTION

The site was occupied in May and the solar energy system operated continuously during the month. Total solar energy collected was 2.2 million Btu and the total solar energy used was 1.1 million Btu or 50 percent of the collected energy. Energy transport and air duct leakage losses were not determined because of lack of instrumentation and problems with the temperature sensors along the air duct. Solar energy satisfied 85 percent of the DHW requirements and 100 percent of the space heating requirements. The solar energy system provided an electrical savings of 0.89 million Btu.

WEATHER CONDITIONS

During the month, total incident solar energy on the collector array wa. 14.4 million Btu for a daily average of 1325 Btu per square foot. This was below the estimated average daily solar radiation for this geographical area during May of 1478 Btu per square foot for a south-facing plane with a tilt of 45 degrees to the horizontal. The average ambient temperature during May was 63°F as compared with the long-term average for May of 64°F.

The number of heating degree-days for the month (based on a 65°F reference) was 103, as compared with the long-term average of 110. The number of cooling degree-days was 46, as compared with the long-term average of 70.

THERMAL PERFORMANCE

System - During May the solar energy system performed approximately as expected. The expected performance was determined from a modified f-chart analysis using measured weather and subsystem loads as input. Solar energy used by the system was estimated by assuming that all energy collected would be applied to the load. Actual solar energy used was 1.1 million Btu versus an estimated 1.3 million Btu. System total solar fraction was 86 percent versus an estimated 100 percent.

Collector - The total incident solar radiation on the collector array for the month of May was 14.4 million Btu. During the period the collector loop was operating, the total insolation amounted to 8.6 million Btu. The total collected solar energy for the month of May was 2.2 million Btu, resulting in a collector array efficiency of 15 percent, based on total incident insolation. Solar energy delivered from the collector array to storage was 2.2 million Btu. Operating energy required by the collector loop was 0.15 million Btu.

Storage - Solar energy delivered to storage was 2.2 million Btu. There were 1.1 million Btu delivered from storage to the DHW and space heating subsystems. Energy loss from storage was 1.1 million Btu and represented 50 percent of the energy delivered to storage. The storage efficiency was 50 percent: This is calculated as the ratio of the sum of the energy removed from storage and the change in stored energy, to the energy delivered to storage. The average storage temperature for the month was 156°F.

DHW Load - The DHW subsystem consumed 1.0 million Btu of solar energy and 0.19 million Btu of auxiliary electrical energy to satisfy a hot water load

of 1.1 million Btu. The solar fraction of this load was 85 percent. Losses from the DHW subsystem were 0.09 million Btu. The DHW subsystem provided an electrical energy savings of 1.0 million Btu. A daily average of 51 gallons of DHW was consumed at an average temperature of 136°F delivered from the tank.

Space Heating Load - The space heating subsystem consumed 0.065 million Btu of solar energy and no auxiliary electrical energy to satisfy a space heating load of 0.065 million Btu. The solar fraction of this load was 100 percent. The space heating subsystem consumed a total of 0.003 million Btu of operating energy, resulting in an electrical energy savings of 0.028 million Btu.

ENERGY SAVINGS

The solar energy system provided a net electrical energy savings of 0.89 million Btu. The DHW subsystem provided an electrical energy savings of 1.0 million Btu, while the space heating subsystem contibuted an electrical energy savings of 0.028 million Btu.

III. ACTION STATUS

Boeing is expected to investigate the problems with the temperature sensors along the air duct.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

SITE: J.D. EVANS,INC. HOUSE A, COLUMBIA, MARYLAND — SOLAR/1012-79/05
REPORT PERIOD: MAY,197[illegible]

SITE/SYSTEM DESCRIPTION:
THE INSTALLATION CONSISTS OF TWO ADJACENT BUT SEPARATE RESIDENCES USING A SINGLE J-BOX AND SDAS. THE TWO HOUSES HAVE IDENTICAL AND INDEPENDENT SOLAR ASSISTED SYSTEMS. A LIQUID COLLECTOR TRANSFERS SOLAR HEAT TO A 1000 GALLON STORAGE TANK. A HEAT EXCHANGER IN THE STORAGE TANK PREHEATS DOMESTIC HOT WATER. STORAGE WATER IS CIRCULATED TO AN INDUCTIVE HEAT EXCHANGER FOR SPACE HEATING. RESISTANCE HEATING AND A HEAT PUMP, WHICH SUPPLIES SOME HEAT AND ALL COOLING, COMPLETE THE SYSTEM. ALL AUXILIARY ENERGY USED IS ELECTRIC.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	14.375	MILLION BTU
	41070	BTU/SQ.FT.
COLLECTED SOLAR ENERGY	2.194	MILLION BTU
	6267	BTU/SQ.FT.
AVERAGE AMBIENT TEMPERATURE	63	DEGREES F
AVERAGE BUILDING TEMPERATURE	72	DEGREES F
ECSS SOLAR CONVERSION EFFICIENCY	0.07	
ECSS OPERATING ENERGY	0.152	MILLION BTU
TOTAL SYSTEM OPERATING ENERGY	0.155	MILLION BTU
TOTAL ENERGY CONSUMED	2.534	MILLION BTU

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING	SYSTEM TOTAL	
LOAD	1.059	0.065	N.A.	1.124	MILLION BTU
SOLAR FRACTION	85	100	N.A.	86	PERCENT
SOLAR ENERGY USED	1.010	0.065	N.A.	1.075	MILLION BTU
OPERATING ENERGY	N.A.	0.003	N.A.	0.155	MILLION BTU
AUX. THERMAL ENERGY	0.186	0.000	N.A.	0.186	MILLION BTU
AUX. ELECTRIC FUEL	0.186	0.000	N.A.	0.186	MILLION BTU
AUX. FOSSIL FUEL	N.A.	N.A.	N.A.	N.A.	MILLION BTU
ELECTRICAL SAVINGS	1.010	0.028	N.A.	0.886	MILLION BTU
FOSSIL SAVINGS	N.A.	N.A.	N.A.	N.A.	MILLION BTU

SYSTEM PERFORMANCE FACTOR: 0.991

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT OF THE NATIONAL SOLAR DATA PROGRAM,FEBRUARY 28,1978, SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

SITE: J.D. EVANS,INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-79/05
REPORT PERIOD: MAY,1979

SITE/SYSTEM DESCRIPTION:
THE INSTALLATION CONSISTS OF TWO ADJACENT BUT SEPARATE RESIDENCES USING A SINGLE J-BOX AND SDAS. THE TWO HOUSES HAVE IDENTICAL AND INDEPENDENT SOLAR ASSISTED SYSTEMS. A LIQUID COLLECTOR TRANSFERS SOLAR HEAT TO A 1000 GALLON STORAGE TANK. A HEAT EXCHANGER IN THE STORAGE TANK PREHEATS DOMESTIC HOT WATER. STORAGE WATER IS CIRCULATED TO AN INDUCTIVE HEAT EXCHANGER FOR SPACE HEATING. RESISTANCE HEATING AND A HEAT PUMP, WHICH SUPPLIES SOME HEAT AND ALL COOLING, COMPLETE THE SYSTEM. ALL AUXILIARY ENERGY USED IS ELECTRIC.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	15.165	GIGA JOULES
	466392	KJ/SQ.M.
COLLECTED SOLAR ENERGY	2.314	GIGA JOULES
	71172	KJ/SQ.M.
AVERAGE AMBIENT TEMPERATURE	17	DEGREES C
AVERAGE BUILDING TEMPERATURE	22	DEGREES C
ECSS SOLAR CONVERSION EFFICIENCY	0.07	
ECSS OPERATING ENERGY	0.160	GIGA JOULES
TOTAL SYSTEM OPERATING ENERGY	0.163	GIGA JOULES
TOTAL ENERGY CONSUMED	2.674	GIGA JOULES

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING	SYSTEM TOTAL
LOAD	1.117	0.068	N.A.	1.186 GIGA JOULES
SOLAR FRACTION	85	100	N.A.	86 PERCENT
SOLAR ENERGY USED	1.066	0.068	N.A.	1.134 GIGA JOULES
OPERATING ENERGY	N.A.	0.004	N.A.	0.163 GIGA JOULES
AUX. THERMAL ENG	0.196	0.000	N.A.	0.196 GIGA JOULES
AUX. ELECTRIC FUEL	0.196	0.000	N.A.	0.196 GIGA JOULES
AUX. FOSSIL FUEL	N.A.	N.A.	N.A.	N.A. GIGA JOULES
ELECTRICAL SAVINGS	1.066	0.029	N.A.	0.935 GIGA JOULES
FOSSIL SAVINGS	N.A.	N.A.	N.A.	N.A. GIGA JOULES

SYSTEM PERFORMANCE FACTOR: 0.991

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT OF THE NATIONAL SOLAR DATA PROGRAM,FEBRUARY 28,1978, SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENERGY COLLECTION AND STORAGE SUBSYSTEM (ECSS)

SITE: J.D. EVANS,INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-79/05
REPORT PERIOD: MAY,1979

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	AMBIENT TEMP DEG-F	ENERGY TO LOADS MILLION BTU	AUX THERMAL TO ECSS MILLION BTU	ECSS OPERATING ENERGY MILLION BTU	ECSS ENERGY REJECTED MILLION BTU	ECSS SOLAR CONVERSION EFFICIENCY
1	0.606	57	N	N	0.009	N	0.019
2	0.699	55	O	O	0.008	O	0.080
3	0.237	62	T	T	0.000	T	0.160
4	0.183	60			0.000		0.163
5	0.767	53	A	A	0.009	A	0.032
6	0.570	57	P	P	0.005	P	0.196
7	0.708	64	P	P	0.009	P	0.033
8	0.602	70	L	L	0.007	L	0.026
9	0.730	75	I	I	0.009	I	0.042
10	0.620	75	C	C	0.009	C	0.065
11	0.597	75	A	A	0.008	A	0.033
12	0.128	66	B	B	0.000	B	0.376
13	0.139	66	L	L	0.000	L	0.322
14	0.272	60	E	E	0.002	E	0.128
15	0.672	64			0.009		0.043
16	0.755	60			0.008		0.061
17	0.732	59			0.007		0.052
18	0.254	59			0.000		0.150
19	0.468	63			0.005		0.090
20	0.271	62			0.002		0.146
21	0.190	63			0.000		0.242
22	0.394	65			0.005		0.115
23	0.262	67			0.002		0.080
24	0.377	66			0.004		0.024
25	0.453	60			0.008		0.057
26	0.363	55			0.000		0.136
27	0.340	61			0.001		0.038
28	0.314	59			0.004		0.100
29	0.595	64			0.008		0.021
30	0.604	67			0.010		0.074
31	0.270	69			0.002		0.040
SUM	14.375	-	N.A.	N.A.	0.152	N.A.	-
AVG	0.464	63	N.A.	N.A.	0.005	N.A.	0.075
NBS ID	Q001	N113			Q102		N111

# DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
COLLECTOR ARRAY PERFORMANCE

SITE: J.D. EVANS,INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-79/05
REPORT PERIOD: MAY,1975

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	OPERATIONAL INCIDENT ENERGY MILLION BTU	COLLECTED SOLAR ENERGY MILLION BTU	DAYTIME AMBIENT TEMP DEG F	COLLECTOR ARRAY EFFICIENCY
1	0.806	0.644	0.164	62	0.203
2	0.699	0.529	0.149	65	0.213
3	0.237	0.000	0.000	69	0.000
4	0.183	0.000	0.000	65	0.000
5	0.767	0.628	0.186	58	0.242
6	0.570	0.336	0.101	68	0.177
7	0.708	0.573	0.158	77	0.224
8	0.602	0.397	0.108	82	0.179
9	0.730	0.595	0.161	83	0.221
10	0.620	0.489	0.119	85	0.192
11	0.597	0.459	0.112	83	0.188
12	0.128	0.000	0.000	68	0.000
13	0.139	0.000	0.000	69	0.000
14	0.272	0.113	0.025	61	0.091
15	0.672	0.518	0.130	75	0.193
16	0.755	0.555	0.140	67	0.186
17	0.732	0.464	0.128	68	0.175
18	0.254	0.000	0.000	65	0.000
19	0.468	0.301	0.063	68	0.135
20	0.271	0.072	0.009	65	0.034
21	0.190	0.000	0.000	69	0.000
22	0.394	0.205	0.041	70	0.105
23	0.262	0.064	0.008	71	0.029
24	0.377	0.213	0.063	*	0.167
25	0.453	0.323	0.058	66	0.127
26	0.363	0.000	0.000	58	0.000
27	0.340	0.054	0.000	68	0.001
28	0.314	0.161	0.042	66	0.134
29	0.595	0.425	0.126	74	0.212
30	0.604	0.462	0.095	76	0.158
31	0.270	0.055	0.006	74	0.024
SUM	14.375	8.635	2.194	—	—
AVG	0.464	0.279	0.071	70	0.153
NBSID	Q001		Q100		N100

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
STORAGE PERFORMANCE

SITE: J.D. EVANS, INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-79/05
REPORT PERIOD: MAY, 1979

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	CHANGE IN STORED ENERGY MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
1	0.164	0.016	0.086	153	0.618
2	0.149	0.056	0.028	161	0.561
3	0.000	0.038	-0.084	159	1.000
4	0.000	0.030	-0.074	146	1.000
5	0.166	0.025	0.097	146	0.654
6	0.101	0.112	-0.066	151	0.454
7	0.158	0.024	0.084	151	0.680
8	0.108	0.016	0.021	159	0.336
9	0.161	0.030	0.052	164	0.512
10	0.119	0.041	0.013	169	0.452
11	0.112	0.020	0.041	171	0.542
12	0.000	0.048	-0.070	171	1.000
13	0.000	0.045	-0.059	162	1.000
14	0.025	0.035	-0.030	154	0.188
15	0.130	0.029	0.071	158	0.767
16	0.140	0.046	0.065	167	0.793
17	0.128	0.038	0.049	175	0.680
18	0.000	0.038	-0.063	174	1.000
19	0.063	0.042	-0.013	170	0.456
20	0.009	0.040	-0.055	163	-1.656
21	0.000	0.046	-0.062	155	1.000
22	0.041	0.045	-0.021	150	0.594
23	0.008	0.021	-0.033	146	-1.609
24	0.063	0.009	0.041	145	0.790
25	0.058	0.026	0.005	149	0.540
26	0.000	0.049	-0.060	146	1.000
27	0.000	0.013	-0.028	140	-35.166
28	0.042	0.032	0.000	138	0.747
29	0.126	0.013	0.097	144	0.869
30	0.095	0.045	0.029	153	0.770
31	0.006	0.011	-0.035	152	-3.722
SUM	2.194	1.075	0.025	-	-
AVG	0.071	0.035	0.001	156	0.502
NBS ID	Q200	Q201	Q202		N108

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

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SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
HOT WATER SUBSYSTEM

SITE: J.D. EVANS,INC. HOUSE A, COLUMBIA, MARYLAND
REPORT PERIOD: MAY,1979

SOLAR/1012-79/05

DAY OF MON.	HOT WATER LOAD MILLION BTU	SOLAR FR.OF LOAD PER CENT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	SUP. WAT. TEMP DEG F	HOT WAT. TEMP DEG F	HOT WATER USED GAL
1	0.018	35	0.016	N	0.008	0.008	N	0.016	N	63	140	26
2	0.035	70	0.035	C	0.005	0.005	O	0.035	O	62	139	49
3	0.042	82	0.038	T	0.008	0.008	T	0.038	T	63	138	58
4	0.037	79	0.030		0.013	0.013		0.030		58	139	51
5	0.024	68	0.018	A	0.009	0.009	A	0.018	A	64	139	33
6	0.089	77	0.074	P	0.020	0.020	P	0.074	P	59	140	123
7	0.026	78	0.024	P	0.007	0.007	P	0.024	P	64	139	37
8	0.017	78	0.016	L	0.005	0.005	L	0.016	L	60	137	24
9	0.028	87	0.030	I	0.002	0.002	I	0.030	I	64	138	41
10	0.036	96	0.041	C	0.000	0.000	C	0.041	C	66	137	52
11	0.017	99	0.020	A	0.000	0.000	A	0.020	A	60	138	25
12	0.043	100	0.048	E	0.000	0.000	B	0.048	B	57	139	62
13	0.045	100	0.045	L	0.000	0.000	L	0.045	L	60	137	67
14	0.035	100	0.035	E	0.000	0.000	E	0.035	E	60	131	56
15	0.025	100	0.029		0.000	0.000		0.029		63	125	45
16	0.038	100	0.046		0.000	0.000		0.046		64	128	62
17	0.032	100	0.038		0.000	0.000		0.038		65	135	49
18	0.033	100	0.038		0.000	0.000		0.038		60	138	48
19	0.038	100	0.042		0.000	0.000		0.042		58	138	56
20	0.040	100	0.040		0.000	0.000		0.040		61	137	60
21	0.045	100	0.046		0.000	0.000		0.046		61	130	74
22	0.044	100	0.045		0.000	0.000		0.045		61	123	81
23	0.023	72	0.021		0.015	0.015		0.021		65	130	38
24	0.011	61	0.009		0.007	0.007		0.009		61	139	16
25	0.034	66	0.026		0.013	0.013		0.026		61	139	50
26	0.065	74	0.049		0.018	0.018		0.049		59	140	93
27	0.019	64	0.013		0.011	0.011		0.013		62	140	27
28	0.043	64	0.032		0.018	0.018		0.032		62	140	63
29	0.015	67	0.013		0.006	0.006		0.013		61	140	23
30	0.051	79	0.045		0.010	0.010		0.045		62	138	76
31	0.013	74	0.011		0.008	0.008		0.011		67	137	19
SUM	1.059	-	1.010	N.A.	0.186	0.186	N.A.	1.010	N.A.	-	-	1583
AVG	0.034	85	0.033	N.A.	0.006	0.006	N.A.	0.033	N.A.	62	136	51
NBS	Q302	N300	Q300	Q303	Q301	Q305	Q306	Q311	Q313	N305	N307	N308

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

4296

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SPACE HEATING SUBSYSTEM

SITE: J.D. EVANS,INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-79/05
REPORT PERIOD: MAY,1979

DAY OF MON.	SPACE HEATING LOAD MILLION BTU	SOLAR FR.OF LOAD PCT.	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG TEMP DEG. F	AMB TEMP DEG. F
1	0.000	0	0.000	0.000	0.000	0.000	N	0.000	N	71	57
2	0.020	100	0.020	0.001	0.000	0.000	O	0.009	O	71	55
3	0.000	0	0.000	0.000	0.000	0.000	T	0.000	T	72	62
4	0.000	0	0.000	0.000	0.000	0.000		0.000		74	60
5	0.007	100	0.007	0.000	0.000	0.000	A	0.003	A	70	53
6	0.037	100	0.037	0.002	0.000	0.000	P	0.016	P	71	57
7	0.000	0	0.000	0.000	0.000	0.000	P	0.000	P	72	64
8	0.000	0	0.000	0.000	0.000	0.000	L	0.000	L	75	70
9	0.000	0	0.000	0.000	0.000	0.000	I	0.000	I	78	75
10	0.000	0	0.000	0.000	0.000	0.000	C	0.000	C	75	75
11	0.000	0	0.000	0.000	0.000	0.000	A	0.000	A	72	75
12	0.000	0	0.000	0.001	0.000	0.000	B	0.000	B	72	66
13	0.000	0	0.000	0.000	0.000	0.000	L	0.000	L	74	66
14	0.000	0	0.000	0.000	0.000	0.000	E	0.000	E	72	60
15	0.000	0	0.000	0.000	0.000	0.000		0.000		72	64
16	0.000	0	0.000	0.000	0.000	0.000		0.000		72	60
17	0.000	0	0.000	0.000	0.000	0.000		0.000		70	59
18	0.000	0	0.000	0.000	0.000	0.000		0.000		70	59
19	0.000	0	0.000	0.000	0.000	0.000		0.000		71	63
20	0.000	0	0.000	0.000	0.000	0.000		0.000		72	62
21	0.000	0	0.000	0.000	0.000	0.000		0.000		71	63
22	0.000	0	0.000	0.000	0.000	0.000		0.000		72	65
23	0.000	0	0.000	0.000	0.000	0.000		0.000		73	67
24	0.000	0	0.000	0.000	0.000	0.000		0.000		74	66
25	0.000	0	0.000	0.000	0.000	0.000		0.000		73	60
26	0.000	0	0.000	0.000	0.000	0.000		0.000		72	55
27	0.000	0	0.000	0.000	0.000	0.000		0.000		70	61
28	0.000	0	0.000	0.000	0.000	0.000		0.000		71	59
29	0.000	0	0.000	0.000	0.000	0.000		0.000		71	64
30	0.000	0	0.000	0.000	0.000	0.000		0.000		73	67
31	0.000	0	0.000	0.000	0.000	0.000		0.000		73	69
SUM	0.065	-	0.065	0.003	0.000	0.000	N.A.	0.028	N.A.	-	-
AVG	0.002	100	0.002	0.000	0.000	0.000	N.A.	0.001	N.A.	72	63
NBS	Q402	N400	Q400	Q403	Q401		Q410	Q415	Q417	N406	N113

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

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SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENVIRONMENTAL SUMMARY

SITE: J.D. EVANS, INC. HOUSE A, COLUMBIA, MARYLAND
REPORT PERIOD: MAY, 1979

SOLAR/1012-79/05

DAY OF MONTH	TOTAL INSOLATION BTU/SQ.FT	DIFFUSE INSOLATION BTU/SQ.FT	AMBIENT TEMPERATURE DEG F	DAYTIME AMBIENT TEMP DEG F	RELATIVE HUMIDITY PERCENT	WIND DIRECTION DEGREES	WIND SPEED M.P.H.
1	2303	N	57	62	N	N	N
2	1998	O	55	65	O	O	O
3	676	T	62	69	T	T	T
4	523		60	65			
5	2192	A	53	58	A	A	A
6	1630	P	57	68	P	P	P
7	2022	P	64	77	P	P	P
8	1721	L	70	82	L	L	L
9	2085	I	75	83	I	I	I
10	1771	C	75	85	C	C	C
11	1707	A	75	83	A	A	A
12	367	B	66	68	B	B	B
13	397	L	66	69	L	L	L
14	776	E	60	61	E	E	E
15	1920		64	75			
16	2156		60	67			
17	2090		59	68			
18	727		59	65			
19	1337		63	68			
20	775		62	65			
21	543		63	69			
22	1125		65	70			
23	750		67	71			
24	1078		66	*			
25	1296		60	66			
26	1038		55	58			
27	972		61	68			
28	898		59	66			
29	1699		64	74			
30	1725		67	76			
31	773		69	74			
SUM	41070	N.A.	-	-	-	-	-
AVG	1325	N.A.	63	70	N.A.	N.A.	N.A.
NBS ID	C001		N113			N115	N114

* DENOTES UNAVAILABLE DATA.
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